In the Claims:

1. (Cancelled)

2. (Currently Amended) The method of claim ~~1~~ 33, further comprising the step of using at least one filter to adjust the spectrum of the incident light.

3. (Currently Amended) The method of claim ~~1~~ 33, wherein each of steps (b) and (d) is independently characterized by spectral resolution ranging between 1 nm and 50 nm and spatial resolution ranging between 0.1 mm and 1.0 mm.

4. (Currently Amended) The method of claim ~~1~~ 33, wherein each of steps (b) and (d) is effected via an interferometer-based spectral imaging device.

5. (Cancelled)

6. (Currently Amended) The method of claim ~~1~~ 33, further comprising the steps of generating individual spectra-images from spectra acquired in steps (b) and (d).

7. (Original) The method of claim 6, wherein said spectral-images are generated by attributing each of the pixels in the images a distinctive color or intensity according to oxygen saturation and/or blood volume characterizing its respective picture element in the cortex.

8. (Currently Amended) The method of claim ~~1~~ 33, wherein the subject is awake.

9. (Currently Amended) The method of claim ~~1~~ 33, wherein the subject is anesthetized.

10. (Currently Amended) The method of claim ~~1~~ 33, wherein step (c) is effected by asking the subject to perform a task.

11. (Original) The method of claim 10, wherein said task is selected from the group consisting of reading, speaking, listening, viewing, memorizing, thinking and executing a voluntary action.

12. (Currently Amended) The method of claim ~~1~~ 33, wherein step (c) is effected by a method selected from the group consisting of passively stimulating the brain through the peripheral nervous system of the subject and directly stimulating the cortex.

13. (Currently Amended) The method of claim ~~1~~ 33, further comprising the step of generating an anatomical image of the exposed cortex and co-displaying said image highlighting differences among spectra of the exposed cortex and the anatomical image of the exposed cortex.

14. (Original) The method of claim 13, wherein said image highlighting differences among spectra of the exposed cortex and the anatomical image of the exposed cortex are co-displayed side by side.

15. (Original) The method of claim 13, wherein said image highlighting differences among spectra of the exposed cortex and the anatomical image of the exposed cortex are superimposed.

16. (Currently Amended) The method of claim ~~1~~ 33, wherein step (e) comprises a use of at least one threshold while generating the image highlighting differences among spectra of the exposed cortex acquired in steps (b) and (d).

17. (Currently Amended) The method of claim ~~1~~ 33, wherein said image highlighting differences among spectra of the exposed cortex acquired in steps (b) and (d) is color or intensity coded.

18. (Currently Amended) The method of claim ~~1~~ 33, wherein medical lines are connected to the subject on a single side thereof.

19. (Currently Amended) The method of claim ~~1~~ 33, wherein medical lines are connected to the subject on a right or left side thereof.

20. (Currently Amended) The method of claim ~~1~~ 33, wherein medical lines are connected to the subject at locations which are less communicating with the exposed portion of the cortex of the subject.

21. (Original) The method of claim 7, wherein said step (e) is characterized by highlighting oxygen saturation and/or blood volume differences of about at least 10%.

22. (Original) The method of claim 7, wherein said step (e) is characterized by highlighting oxygen saturation differences and/or blood volume of about at least 5%.

23. (Original) The method of claim 8, further comprising the step of also acquiring a reflectance spectrum of each picture element of at least the portion of the exposed cortex of the subject when the patient is briefly anesthetized.

24. (Currently Amended) The method of claim ~~1~~ 33, wherein each of steps (b) and (d) is performed during at least N brain beats of the subject, wherein N is an integer selected from the group consisting of two, three, four, five, six, seven, eight, nine, ten and an integer between and including eleven and forty.

25. (Currently Amended) The method of claim ~~1~~ 33, wherein step (d) is executed more than about 3-5 seconds after initiation of step (c).

26. (Currently Amended) The method of claim ~~1~~ 33, wherein step (d) is executed between about 5 and about 30 seconds after initiation of step (c).

27. (Currently Amended) The method of claim ~~1~~ 33, wherein said stimulation prolongs about 5 to about 30 seconds.

28. (Currently Amended) The method of claim ~~1~~ 33, wherein said stimulation prolongs about 10 to about 20 seconds.

29. (Currently Amended) The method of claim ~~1~~ 33, wherein said filters-based spectral imaging device includes filters selected so as to collect spectral data of intensity peaks or steeps characterizing one or more spectrally monitored substances.

30. (Cancelled)

31. (Currently Amended) The method of claim ~~1~~ 33, wherein each of said filters is individually about 5 to about 15 nm full-width-at-half-maximum filter.

32. (Currently Amended) The method of claim ~~1~~ 33, wherein each of said filters is individually about 10 nm full-width-at-half-max filter.

33. (Currently Amended) ~~The~~ A method of ~~claim 30,~~ functional brain mapping of a subject comprising the steps of:

(a) illuminating an exposed cortex of a brain or portion thereof of the subject with incident light;

(b) acquiring a reflectance spectrum of each picture element of at least a portion of the exposed cortex of the subject;

(c) stimulating the brain of the subject;

(d) during or after step (c) acquiring at least one additional reflectance spectrum of each picture element of at least the portion of the exposed cortex of the subject; and

(e) generating an image highlighting differences among spectra of the exposed cortex acquired in steps (b) and (d), so as to highlight functional brain regions;

wherein each of steps (b) and (d) is effected via a filters-based spectral imaging device;

wherein said filters-based spectral imaging device includes filters selected so as to collect spectral data of intensity peaks or steeps characterizing hemoglobin selected from the group consisting of deoxy-hemoglobin, oxy-hemoglobin and deoxy-hemoglobin and oxy-hemoglobin; and

wherein said filters include N filters selected from the group consisting of an about 540 nm maximal transmittance filter, an about 575 nm maximal transmittance filter, an about 555 nm maximal transmittance filter, an about 513 nm maximal transmittance filter and an about 600 nm maximal transmittance filter, whereas N is an integer selected from the group consisting two, three, four and five.

34. (Original) The method of claim 33, wherein N equals two.

35. (Original) The method of claim 33, wherein N equals three.

36. (Original) The method of claim 33, wherein N equals four.

37. (Original) The method of claim 33, wherein N equals five.

38. (Currently Amended) The method of claim ~~30~~ 33, wherein said filters include at least one multiple chroic filter.

39. (Currently Amended) ~~The~~ A method of ~~claim 30,~~ functional brain mapping of a subject comprising the steps of:

(a) illuminating an exposed cortex of a brain or portion thereof of the subject with incident light;

(b) acquiring a reflectance spectrum of each picture element of at least a portion of the exposed cortex of the subject;

(c) stimulating the brain of the subject;

(d) during or after step (c) acquiring at least one additional reflectance spectrum of each picture element of at least the portion of the exposed cortex of the subject; and

(e) generating an image highlighting differences among spectra of the exposed cortex acquired in steps (b) and (d), so as to highlight functional brain regions;

wherein each of steps (b) and (d) is effected via a filters-based spectral imaging device;

wherein said filters-based spectral imaging device includes filters selected so as to collect spectral data of intensity peaks or steeps characterizing hemoglobin selected from the group consisting of deoxy-hemoglobin, oxy-hemoglobin and deoxy-hemoglobin and oxy-hemoglobin; and

wherein said filters include at least one filter of maximal transmittance at a wavelength which corresponds to at least one isosbasthic point of deoxy-hemoglobin and oxy-hemoglobin and at least one additional filter of maximal transmittance at a wavelength which corresponds to at least one non-isosbasthic point of deoxy-hemoglobin and oxy-hemoglobin.

40. (Currently Amended) The method of claim ~~1~~ 33, wherein said reflectance spectrum of step (b) is an averaged reference spectrum of N measurements, wherein N is an integer and equals at least 2.

41. (Currently Amended) The method of claim ~~1~~ 33, wherein said reflectance spectrum of step (d) is an averaged reference spectrum, wherein N is an integer and equals at least 2.

42. (Currently Amended) The method of claim ~~1~~ 33, further comprising the steps of spatially registrating spectral data acquired in steps (b) and (d).

43. (Currently Amended) The method of claim ~~1~~ 39, wherein said image highlighting differences among spectra of the exposed cortex acquired in steps (b) and (d) is highlighting oxygen saturation and/or blood volume differences.

44. (Original) The method of claim 43, wherein step (e) comprises a use of at least one threshold while generating the image highlighting differences among spectra

of the exposed cortex acquired in steps (b) and (d) of oxygen saturation and/or blood volume differences.

45. (Original) The method of claim 44, wherein said at least one threshold includes taking into account only picture elements in which, in step (b), in step (d) or both, an absolute oxygen saturation and/or blood volume is above a predetermined first threshold.

46. (Original) The method of claim 45, wherein said at least one threshold further includes taking into account only picture elements in which a difference in oxygen saturation and/or blood volume is above a predetermined second threshold.

47. (Original) The method of claim 46, wherein clusters of neighboring picture elements above said first and said second threshold, said clusters include less than a predetermined number picture elements, are discarded.

48. (Original) The method of claim 44, wherein said at least one threshold includes taking into account only picture elements in which a difference in oxygen saturation and/or blood volume is above a predetermined threshold.

49. (Original) The method of claim 44, wherein said at least one threshold is effected by discarding clusters of neighboring picture elements which include less than a predetermined number picture elements highlighting differences among spectra of the exposed cortex acquired in steps (b) and (d) of oxygen saturation and/or blood volume differences.

50. (Original) The method of claim 6, wherein said step of generating individual spectra-images from spectra acquired in steps (b) and (d) includes generating color or intensity coded saturation and/or blood volume maps.

51. (Original) The method of claim 50, wherein said coded saturation maps are coded oxygen saturation maps.

52. (Original) The method of claim 50, further comprising the step of generating an anatomical image of the exposed cortex and co-displaying at least one of said color or intensity coded saturation and/or blood volume maps and the anatomical image of the exposed cortex.

53. (Original) The method of claim 52, wherein said anatomical image is a monochromatic image.

54. (Original) The method of claim 52, wherein said anatomical image is a grayscale image.

55. (Original) The method of claim 52, wherein said anatomical image is a red-green-blue image.

56. (Original) The method of claim 52, wherein at least one of said color or intensity coded saturation and/or blood volume maps and the anatomical image of the exposed cortex are co-displayed side by side.

57. (Original) The method of claim 52, wherein at least one of said color or intensity coded saturation and/or blood volume maps and the anatomical image of the exposed cortex are superimposed.

58. (Currently Amended) The method of claim ~~1~~ 33, wherein said image highlighting differences among spectra of the exposed cortex acquired in steps (b) and (d), so as to highlight functional brain regions, is coded via color or intensity so as to distinguish degree of said differences in accordance with at least one difference threshold.

59. (Original) The method of claim 13, wherein said anatomical image is a monochromatic image.

60. (Original) The method of claim 13, wherein said anatomical image is a grayscale image.

61. (Original) The method of claim 13, wherein said anatomical image is a red-green-blue image.

62. – 169. (Cancelled)

170. (Currently Amended) The system of claim ~~169~~ 188, further comprising at least one filter being engaged with said illumination device to adjust the spectrum of the incident light.

171. (Currently Amended) The system of claim ~~169~~ 188, so designed and constructed so as to provide spectral resolution ranging between 1 nm and 50 nm and spatial resolution ranging between 0.1 mm and 1.0 mm.

172. (Currently Amended) The system of claim ~~169~~ 188, wherein said spectral imaging device is an interferometer-based spectral imaging device.

173. (Currently Amended) The system of claim ~~169~~ 188, wherein said spectral imaging device is a filters-based spectral imaging device.

174. (Currently Amended) The system of claim ~~169~~ 188, wherein said image generating device is designed and constructed for generating individual spectra-images from spectra of the exposed cortex acquired before and during and/or after stimulating the brain of the subject.

175. (Original) The system of claim 174, wherein said spectral-images are generated by attributing each of the pixels in the images a distinctive color or intensity according to oxygen saturation and/or blood volume and/or blood volume characterizing its respective picture element in the cortex.

176. (Currently Amended) The system of claim ~~169~~ 188, wherein said image generating device is designed and constructed for generating an anatomical image of the exposed cortex and co-displaying said image highlighting differences among spectra of the exposed cortex and the anatomical image of the exposed cortex.

177. (Original) The system of claim 176, wherein said image highlighting differences among spectra of the exposed cortex and the anatomical image of the exposed cortex are co-displayed by said image generating device side by side.

178. (Original) The system of claim 176, wherein said image highlighting differences among spectra of the exposed cortex and the anatomical image of the exposed cortex are superimposed by said image generating device.

179. (Currently Amended) The system of claim ~~169~~ 188, wherein said image generating device uses at least one threshold while generating the image highlighting differences among spectra of the exposed cortex.

180. (Currently Amended) The system of claim ~~169~~ 188, wherein said image highlighting differences among spectra of the exposed cortex is color or intensity coded by said image generating device.

181. (Original) The system of claim 175, wherein said image generating device is set to highlight oxygen saturation and/or blood volume differences of about at least 10%.

182. (Original) The system of claim 175, wherein said image generating device is set to highlight oxygen saturation and/or blood volume differences of about at least 5%.

183. (Currently Amended) The system of claim ~~169~~ 188, wherein said spectral imaging device is set for acquiring said reflectance spectra of each of said picture element of at least said portion of the exposed cortex of the subject before and during and/or after stimulating the brain of the subject during at least N brain beats of the subject, wherein N is an integer selected from the group consisting of two, three, four, five, six, seven, eight, nine, ten and an integer between and including eleven and forty.

184. (Currently Amended) The system of claim ~~173~~ 188, wherein said filters-based spectral imaging device includes filters selected so as to collect spectral

data of intensity peaks or steeps characterizing one or more spectrally monitored substances.

185. (Cancelled)

186. (Currently Amended) The system of claim ~~185~~ 188, wherein each of said filters is individually about 5 to about 15 nm full-width-at-half-maximum filter.

187. (Currently Amended) The system of claim ~~185~~ 188, wherein each of said filters is individually about 10 nm full-width-at-half-max filter.

188. (Currently Amended) ~~The~~ A system ~~of claim 185,~~ for functional brain mapping of a subject, the system comprising:

(a) an illumination device for illuminating an exposed cortex of a brain or portion thereof of the subject with incident light;

(b) a spectral imaging device for acquiring reflectance spectra of each picture element of at least a portion of the exposed cortex of the subject before and during and/or after stimulating the brain of the subject; and

(c) an image generating device for generating an image highlighting differences among spectra of the exposed cortex acquired before and during and/or after stimulating the brain of the subject, so as to highlight functional brain regions;

wherein said spectral imaging device is a filters-based spectral imaging device;

wherein said filters-based spectral imaging device includes filters selected so as to collect spectral data of intensity peaks or steeps characterizing hemoglobin selected from the group consisting of deoxy-hemoglobin, oxy-hemoglobin and deoxy-hemoglobin and oxy-hemoglobin; and

wherein said filters include N filters selected from the group consisting of an about 540 nm maximal transmittance filter, an about 575 nm maximal transmittance

filter, an about 555 nm maximal transmittance filter, an about 513 nm maximal transmittance filter and an about 600 nm maximal transmittance filter, whereas N is an integer selected from the group consisting two, three, four and five.

189. (Original) The system of claim 188, wherein N equals two.

190. (Original) The system of claim 188, wherein N equals three.

191. (Original) The system of claim 188, wherein N equals four.

192. (Original) The system of claim 188, wherein N equals five.

193. (Currently Amended) The system of claim ~~185~~ 188, wherein said filters include at least one multiple chroic filter.

194. (Currently Amended) The system of claim ~~185~~ 188, wherein said filters include at least one filter of maximal transmittance at a wavelength which corresponds to at least one isosbasthic point of deoxy-hemoglobin and oxy-hemoglobin and at least one additional filter of maximal transmittance at a wavelength which corresponds to at least one non-isosbasthic point of deoxy-hemoglobin and oxy-hemoglobin.

195. (Currently Amended) The system of claim ~~169~~ 188, wherein said spectral imaging device is designed and constructed for spatially registrating spectral data acquired thereby.

196 – 198. (Cancelled)

199. (Currently Amended) ~~The~~ A system ~~of claim 198,~~ for functional brain mapping of a subject, the system comprising:

(a) an illumination device for illuminating an exposed cortex of a brain or portion thereof of the subject with incident light;

(b) a spectral imaging device for acquiring reflectance spectra of each picture element of at least a portion of the exposed cortex of the subject before and during and/or after stimulating the brain of the subject; and

(c) an image generating device for generating an image highlighting differences among spectra of the exposed cortex acquired before and during and/or after stimulating the brain of the subject, so as to highlight functional brain regions;

wherein said image generating device is designed and constructed for highlighting differences among oxygen saturation and/or blood volume of the cortex;

wherein said image generating device is designed for use of at least one threshold while generating the image highlighting differences among said oxygen saturation and/or blood volume of the cortex;

wherein said at least one threshold includes taking into account only picture elements in which, before, during and/or after said stimulation, an absolute oxygen saturation and/or blood volume is above a predetermined first threshold; and

wherein said at least one threshold further includes taking into account only picture elements in which a difference in oxygen saturation and/or blood volume is above a predetermined second threshold.

200. (Original) The system of claim 199, wherein clusters of neighboring picture elements above said first and said second threshold, said clusters include less than a predetermined number picture elements, are discarded.

201. (Currently Amended) The system of claim ~~197~~ 199, wherein said at least one threshold includes taking into account only picture elements in which a difference in oxygen saturation and/or blood volume is above a predetermined threshold.

202. (Currently Amended) The system of claim ~~197~~ 199, wherein said at least one threshold is effected by discarding clusters of neighboring picture elements which

include less than a predetermined number picture elements highlighting differences among oxygen saturation and/or blood volume of the cortex.

203. (Original) The system of claim 174, wherein said individual spectra-images are color or intensity coded saturation and/or blood volume maps.

204. (Original) The system of claim 203, wherein said coded saturation and/or blood volume maps are coded oxygen saturation and/or blood volume maps.

205. (Original) The system of claim 203, wherein said image generating device is designed and constructed for generating an anatomical image of the exposed cortex and co-displaying at least one of said color or intensity coded saturation and/or blood volume maps and the anatomical image of the exposed cortex.

206. (Original) The system of claim 205, wherein said anatomical image is a monochromatic image.

207. (Original) The system of claim 205, wherein said anatomical image is a grayscale image.

208. (Original) The system of claim 205, wherein said anatomical image is a red-green-blue image.

209. (Original) The system of claim 205, wherein at least one of said color or intensity coded saturation and/or blood volume maps and the anatomical image of the exposed cortex are co-displayed side by side.

210. (Original) The system of claim 205, wherein at least one of said color or intensity coded saturation and/or blood volume maps and the anatomical image of the exposed cortex are superimposed.

211. (Currently Amended) The system of claim ~~169~~ 188, wherein said image generating device is designed and constructed to distinguish degree of said differences in accordance with at least one difference threshold.

212. (Original) The system of claim 176, wherein said anatomical image is a monochromatic image.

213. (Original) The system of claim 176, wherein said anatomical image is a grayscale image.

214. (Original) The system of claim 176, wherein said anatomical image is a red-green-blue image.

215. – 248. (Cancelled)

249. (Currently Amended) The method of claim ~~1~~ 33, wherein said reflectance spectrum of step (b) is an averaged reference spectrum of N brain beats, wherein N is an integer and equals at least 2.

250. – 252. (Cancelled)

253. (Currently Amended) The method of claim ~~1~~ 33, wherein a plurality of images highlighting differences among spectra are displayed either superimposed, overlaid or integrated.

254. (Currently Amended) The method of claim ~~5~~ 33, wherein step (a) is effected by an illumination device operated with an alternating current characterized by a frequency time.

255. (Original) The method of claim 254, wherein (i) an exposure time of all filters of said filters-based spectral imaging device is substantially equal; and (ii) an exposure time of each of said filters is a multiplicity of said frequency time by an integer.

256. – 261. (Cancelled)

262. (Currently Amended) The system of claim ~~169~~ 188, wherein a plurality of images highlighting differences among spectra are displayed either superimposed, overlaid or integrated.

263. (Currently Amended) The system of claim ~~173~~ 188, wherein said illumination device is operated with an alternating current characterized by a frequency time.

264. (Original) The system of claim 263, wherein (i) an exposure time of all filters of said filters-based spectral imaging device is substantially equal; and (ii) an exposure time of each of said filters is a multiplicity of said frequency time by an integer.

265. – 267. (Cancelled)

268. (Original) The method of claim 13, wherein the anatomical image includes text identifying brain portions.

269. (Currently Amended) The method of claim ~~1~~ 33, wherein at least one orientation element is placed on the exposed portion of the cortex prior to step (b), so as to provide orientation.

270. (Original) The method of claim 269, wherein said at least one orientation element also serves as a white target.

271. (Original) The method of claim 270, wherein at least a portion of said at least one orientation element has an index of refraction close to an index of refraction of the cortex.